



UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2018/2019**

COURSE NAME : ALGEBRA
COURSE CODE : BIC 10303
PROGRAMME CODE : BIS / BIP / BIW / BIM
EXAMINATION DATE : DECEMBER 2018 / JANUARY 2019
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **SIX (6)** PAGES

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SECTION A

State whether each of the following statement is TRUE or FALSE.

- Q1 When multiplying $b^8 \cdot b^{10}$ using the product rule, the answer should be b^{18} .
- Q2 Let $f(x) = x^2 - 3$ and $g(x) = 4x + 5$.
When finding solution for $(f + g)(x)$, the answer will be $x^2 + 4x + 2$.
- Q3 Solve $-5 = m + 4$. The solution set is $\{-1\}$.
- Q4 Nine more than twice a number is fifteen.
When translating the information into an algebraic equation, the equation is $9 + x^2 = 15$.
- Q5 Multiply $2k^2(6k^2 + 5k - 3)$. The solution will be $12k^4 + 10k^3 - 6k^2$.
- Q6 Matrix is an array of numbers with dimensions M (rows) by N (columns).
- Q7 $2 = \log_5 x$ means $2^5 = x$.
- Q8 The imaginary unit i is defined as $i = \sqrt{-1}$, where $i^2 = -1$.
- Q9 Two matrices may be added or subtracted if they are the same order.
- Q10 A binomial is a simplified polynomial that has three terms.

(10 marks)

SECTION BAnswer **ALL** questions.**Q11** (a) Draw a graph for the following inequalities.

(i) $-4 \geq k$

(1 mark)

(ii) $3(6a - 8) \geq 48$

(2 marks)

(b) Rationalize the denominator.

(i) $\frac{4}{\sqrt{2}-2}$

(ii) $\frac{a-\sqrt{b}}{a+\sqrt{b}}$

(iii) $\frac{3+\sqrt{3}}{\sqrt{3}-1}$

(9 marks)

(c) Prove the following equation using an appropriate example:

$$\log_b MN = \log_b M + \log_b N?$$

(3 marks)

Q12 (a) Simplify the following equation in standard form.

(i) $7i(-5 + 2i)$

(ii) $(-4 + 7i) + (5 + 10i)$

(2 marks)

(b) Solve $4x^2 + 3x - 2 = 0$ using the Quadratic Formula.

(3 marks)

- (c) A test has 20 questions worth 100 points. The test consists of TRUE/FALSE questions worth 3 points each and multiple choice questions worth 11 point each.

How many multiple choice questions in the test?

(5 marks)

- (d) There is an animal farm where chickens and cows live. Altogether, there are 85 heads and 238 legs.

How many chickens and how many cows are there on the farm?

(5 marks)

- Q13** (a) If $(x - 2)$ is a factor of polynomial $P(x) = 3x^3 - mx^2 - 6x + 8$,

(i) Find the value of m .

(2 marks)

(ii) Then, factorize the polynomial $P(x)$ completely.

(3 marks)

- (b) Solve the quadratic inequality, $2x^2 - 5x - 3 \geq 0$.

(4 marks)

- (c) Decompose the given rational expression into partial fractions.

$$\frac{x^3 + 8}{(x^2 - 1)(x - 2)}$$

(6 marks)

- Q14** (a) Given $f(x) = 4x^2 + 2$, evaluate the following:

(i) $f(x) + h$

(1 mark)

(ii) $f(x + h)$

(2 marks)

- (b) Given $f(x)$ as in **FIGURE Q14 (b)** and let $g(x) = x^2 + 1$,

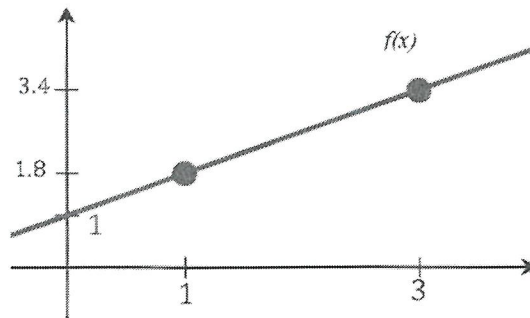


FIGURE Q14 (b)

solve the following equations:

(i) $\frac{g(x)}{f(x+2)}$ (4 marks)

(ii) $f^{-1}(x) - g(x - 1)$ (5 marks)

- (c) Let $f(x)$ be a cubic function. How many intercept on x and y axis can the function have? Explain. (3 marks)

- Q15** (a) Consider the following linear system:

$$\begin{aligned} 3x + 4y - 3z &= 5 \\ 3x - 2y + 4z &= 7 \\ 3x + 2y - z &= 3 \end{aligned}$$

(i) Write the linear system in matrix form $AX = B$ (2 marks)

(ii) Find the determinant of matrix A (2 marks)

(iii) Find x , y and, z by using Cramer's Rule. (6 marks)

(b) Find M^{-1} based on $M = \begin{bmatrix} 1 & 2 & 1 \\ 2 & 3 & 2 \\ 1 & -2 & -3 \end{bmatrix}$ (5 marks)

Q16 (a) Dazzling Florist offers three sizes of flower arrangements containing roses, daisies and carnations during Mother's Day. Each small size arrangement contains one rose, three daisies and three carnations. The medium size arrangement contains two roses, four daisies and six carnations. Meanwhile, large size arrangement contains four roses, eight daisies and six carnations. The owner of the florist noted that she used a total of 24 roses, 50 daisies and 48 carnations in filling orders for these three different types of flower arrangement sizes.

(i) Construct a table (types of flowers vs. arrangement sizes). The last column should indicate the total number of flowers for each type. (2 marks)

(iii) Let:
 x_1 = number of small arrangement
 x_2 = number of medium arrangement
 x_3 = number of large arrangement

Write system of linear equations representing the above problem. (3 marks)

(iii) Hence, by using inverse matrix method, determine the number of different arrangement sizes that Dazzling Florist made during Mother's Day. (4 marks)

(b) Solve the following system of equations by Gauss-Elimination method.

$$b + c = 2$$

$$2a + 3b = 5$$

$$a + b + c = 3$$

(6 marks)

-END OF QUESTIONS -

